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ABSTRACT

The study examined the relationship between impulsivity and field-dependence in 44 prelingually deaf and 29 hearing males (6-15 years old). Impulsivity was assessed via the Matching Familiar Figures Tests, planning ability was assessed using the Porteus Maze Test Quotient, and field dependence was evaluated on the Children's Embedded Figures Test or the Embedded Figures Test (depending on S's age). Findings supported previous research suggesting that deaf Ss are more impulsive than hearing Ss. The best predictors of impulsivity were planning ability, age, and hearing status. Field dependence was also of value as a predictor when planning ability was removed from the analysis. Statistically significant differences in field dependence were found between deaf and hearing Ss as well as between impulsivity and field dependence within each group. Results suggest that deaf and hearing Ss may be impulsive for different reasons. (CL)

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On the Relationship Between Impulsivity and Field-Dependence in Hearing Impaired Children

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Problem behaviors in deaf children, specifically those involving deficient impulse control have been of particular concern to educators and to those providing psychological services to this population. While problem behavior in any group of children is sufficient to warrant concern, problems associated with impulsivity occur to such a degree with deaf children that a focus on impulsivity seems justified.

Impulsivity in hearing-impaired children has been documented by several investigators. Schlesinger and Meadow (1971) determined that 30% of the deaf children in a Riverside, California hearing-impaired program were behavior problems whereas only 10% of a hearing control sample were so designated. Impulsive behavior was the most frequently cited problem. In a cross-cultural study of Yugoslavian and American adolescents using psychoanalytically oriented instruments, Altshuler and his colleagues in 1976 found that deaf adolescents in both cultures were significantly more impulsive than their hearing peers. Most recently, Robert Harris has investigated impulsivity from the perspective of a cognitive style using Kagan's Matching Familiar Figures Test. Harris (1978) studied deaf children of deaf parents as compared to deaf children of hearing parents in an attempt to refute Altshuler's claim that impulsivity was due solely to the absence of audition. Harris' results indicated that it was the deaf children of hearing parents who were likely to be more impulsive than their deaf peers with deaf parents. This finding suggests that parent variables, perhaps parenting style, may be associated with deficits in a child's ability to structure and control experience.

Many of the problems that hearing-impaired children have seem to be a function of deficits in cognitive controls which inhibit impulsive functioning. A focus upon cognitive structures, as represented by a field-dependent or field-independent cognitive style, seems worthy of consideration when attempting to understand impulsivity. One expression of a more field-dependent cognitive style

is a lack of available structured controls for channelling impulse (Witkin and Goodenough, 1981). Field-dependence/independence is a perceptual-analytical style that relies upon the abilities to analyze, synthesize, and structure perceptual experiences. It is concerned with the degree to which the surrounding field has influenced an individual's perception of an element within it. As an example, consider the hidden pictures games frequently found in Highlights Magazine for Children. The field-dependent individual is one who would have difficulty locating the hidden figure. In other words, he or she would be unable to disembed the familiar, less complex figure from the more complex array of lines and other figures.

The field-independent individual is able to readily analyze and structure perceptual information which may lack inherent organization. The field-dependent person has difficulty perceiving analytically, particularly when a situation appears ambiguous. As a result, in situations of response uncertainty, while the field-independent person is able to think analytically and then base a decision to respond upon this analysis, the field-dependent individual has a rather meagre basis for decision-making and may appear to respond impulsively.

This interpretation suggests that one basis for the reportedly higher frequency of impulsiveness in deaf children could be found in a less-differentiated psychological structure as represented by a field-dependent cognitive style. With this in mind, one goal of this investigation was to examine the explanatory and predictive value of field-dependence for impulsivity. Additional variables which were also evaluated for their predictive value were age, hearing status (hearing or hearing-impaired) and planning ability. One previous investigation (Best, 1975) attempted to address this issue using children aged 8-14 using the Rod and Frame Test as a measure of field-dependence and the Q score from the Porteus Maze Test as an index of impulsivity. Best found no relationship between these measures but it is important to note that the Rod and Frame Test is not the best way to assess field-dependence (Witkin and Goodenough, 1981).

It should be noted that the major focus of this study was to examine cognitive indices of impulsivity rather than attempting to measure overt behavioral activity. This is consistent with trends in impulsivity research for both deaf and hearing individuals, where cognitive styles are suggested as an underlying basis for many overt behaviors. Of course, experimental studies would be necessary to determine an appropriate causal relationship between these variables.

Methodology

Subjects for this study were 44 prelingually deaf and 29 hearing males between the ages of 6 and 15 years. Hearing-impaired subjects had a minimum average hearing loss of 70db in their better ear when measured across the speech range and only 3 were the children of deaf parents. Subjects whose deafness was due to maternal rubella were not included. Communication with hearing-impaired children was in American Sign Language.

Impulsivity was assessed using Kagan's Matching Familiar Figures Tests. The MFFT is a match-to-sample task involving the choice of an exact match for the stimulus from six to eight highly similar variants. Scoring for the MFFT typically involves recording the child's mean latency to first response as well as total number of errors. A median split is performed for both scores. Children who score above the sample median for latency and below the median for errors are usually classified as reflective, that is they respond more slowly and make fewer errors. Children scoring below the median for latency and above the median for errors have traditionally been classified as impulsive. Using this system it has only been possible to classify 70% of any given sample of subjects. Furthermore, traditional methods do not permit an understanding of impulsivity as ordered along a continuum ranging from reflective to impulsive. In an effort to classify all of the subjects in this study a scoring transfor-

mation was used (Salkind and Wright, 1977). This method permits the creation of an impulsivity score which integrates both speed and accuracy. The impulsivity (I) score is generated from raw latency and error scores as follows and ranges from -3 (reflective) to +3 (impulsive):

$$I = zE - zI$$

where zE equals a standard score for the individual's total errors and zI equals a standard score for each individual's mean latency.

In addition to the MFFT, subjects planning ability was assessed using the Porteus Maze Test Quotient (TQ). The TQ was used as an index of the child's skill at planning ahead and not as a measure of intelligence. The latter usage has been frequent but its merit is questionable (Buros, 1975).

As a measure of field-dependence subjects were given either the Children's Embedded Figures Test or the Embedded Figures Test depending upon their ages. Since the CEFT is scored 0 or 1 and the EFT is scored in number of seconds to a correct response, it was necessary to devise a conversion scale for the EFT so that both scores would be compatible for standardization and subsequent entry as one variable in the regression analysis. The following scale was used:

EFT Solution Time in seconds	Transformed Score
0-36	1.00
37-72	0.75
73-108	0.50
109-144	0.25
145-180	0

Results

Simultaneous multiple regression and correlational analyses demonstrated that planning ability, age, hearing status, and field-dependence/independence accounted for 47% of the variance in the impulsivity scores. Semi-partial correlations demonstrated that planning ability accounted for 18% of the variance in impulsivity while age accounted for 10% of the variance beyond that. Finally, hearing status accounted uniquely for 5% of the variance in impulsivity. With all of these variables in the regression model, field-dependence did not add to its predictive value. (See Table 1)

However, when planning ability was removed from the regression model, field-dependence was a significant predictor of impulsivity, accounting for 15% of the variance in impulsivity scores. This finding prompted a closer look at the interrelationships of the variables under study.

Correlational analysis revealed significant correlations for the deaf children. These were a correlation of -.50 for planning ability and impulsivity, a .45 for field-dependence and impulsivity, and a +.37 for field-dependence and planning ability. (See Table 2). These relationships were not significantly correlated in the hearing sample. Additional information provided by t-tests indicated that the deaf sample was significantly more field-dependent and significantly more impulsive than their hearing counterparts. (Table 3)

The moderate correlation between field-dependence and planning ability in conjunction with the predictive value of the EFT scores when planning ability is removed from the model suggest that these variable share a large amount of variance accounted for in impulsivity. One implication of this finding is that both the Maze Test and the Embedded Figures Tests may assess a similar psychological construct with the Maze Test having greater predictive value simply because it is the easier task.

Discussion

In conclusion, consistent with earlier research, deaf children were found to be more impulsive than hearing children. The best predictors of impulsivity were planning ability, age, and hearing status. However, field-dependence was also of value as a predictor when planning ability was removed from the analysis. Of particular interest was the finding of statistically significant differences in field-dependence between the deaf and hearing samples as well as significantly different relationships between impulsivity and field-dependence within each group. These findings do support the rationale for this study although it is not possible to determine a causal relationship. These results further suggest that deaf and hearing children may be impulsive for different reasons. For the deaf child, impulsivity appears related to greater field-dependence. While the impulsive deaf child is likely to be field-dependent this does not seem to be the case for the hearing impulsive child.

Of methodological interest was the close relationship which emerged between the Porteus Maze Tests and the Embedded Figures Tests for the deaf children. It may be possible that the Porteus Maze Test has previously unknown value as a disembedding task for deaf children.

Future research may want to examine the relationship between field-dependence and impulsivity in hearing-impaired children more closely. It may be useful to address the issue of what environmental variables influence the expression of these cognitive styles. Child-rearing practices have been demonstrated to influence the development of field-dependence/independence. Harris' (1978) research suggests that parenting practices may influence the development of impulsive behaviors in their children. It is possible that certain parenting

variables may mediate the relationship between field-dependence and impulsivity as well.

Future research may also want to address what greater impulsivity means for the hearing-impaired child. For example, does cognitive impulsivity relate to overt behavioral activity or is it likely to exprers itself in poor judgement and decision-making. With respect to greater field-dependence which implies a deficit in analytical ability, what are the implications for interpersonal relationships of the deaf child. Is the hearing-impaired child likely to be a poor analyzer of interpersonal events as well as of visual-perceptual experiences? These are just a few of the many issues future research may wish to consider.

It is beyond the scope of this study to conclusively offer suggestions for remediation of impulsivity. However, the close relationship between field-dependence and impulsivity suggests that training in visual-perceptual analysis may be a route to take in influencing impulsivity. This training aims at maximizing the child's perceptual analytical ability and might be expected to influence the child's field-dependent cognitive style. Such an influence could possibly generalize to the related impulsive response style. The results of the present study cannot predict the outcome for such training but future research may want to focus on such an intervention.

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Table 1

Variance accounted for in Impulsivity (I)

	% Variance Accounted For	F	P > F
Age	10.0	12.91	.0006
Planning Ability	18.0	22.90	.0001
Field-dependence	(15.0)	(11.17)	(.001)
Hearing Status	5.0	10.19	.002

Table 2

Correlations

	Deaf	Hearing
Planning ability and Impulsivity	-.50***	-.26
Field-dependence and Impulsivity	-.45**	-.04
Field-dependence and Planning Ability	.37*	-.02
Age and field-dependence	.42**	.22

* $p < .01$ ** $p < .002$ *** $p < .0005$

Table 3

T-tests - Hearing-Impaired Sample as compared to Hearing Sample

	t	DF	P> t
Impulsivity	3.46	71	.00045
Field-D/I	-1.90	71	.03000